International Symposium on Vegetable Grafting
3 – 5 Oct. 2011, Viterbo - Italy

[P72] Graft union formation and cell to cell communication via plasmodesmata in stem unions of *Prunus* spp

Ana Pina[1*], Pilar Errea[1], Alexander Schulz[2], Helle Juel Martens[2]

[1]Unidad de Fruticultura, Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA), Zaragoza, Spain

[2]Department of Plant Biology and Biotechnology, Faculty of Life Sciences, University of Copenhagen, Thorvaldsensvej 40, DK-1871 Frederiksberg C, Denmark

*Email: apina@aragon.es

Keywords: callus, cell-to-cell communication, graft responses, *in vitro* unions and histology

Graft compatibility with at least most commercial cultivars is an essential trait in rootstock breeding programs for orchard performance and longevity. However, its range of application is restricted by physiological and biochemical factors that produce incompatible grafts. As a biological process, it is difficult to study the incompatibility reaction due to the wide range of different scion-rootstocks interactions produced when grafted. The aim of this study was to characterize the early cellular signs of graft incompatibility based mainly on histochemical tests and the study of cell-to-cell communication via plasmodesmata using a novel method termed *in vitro* 'stem unions'. Histological and histochemical aspects are described in this work by means of light and confocal microscopy at early developmental stages in different *Prunus* graft combinations. Through FRAP experiments; we determined the plasmodesmal coupling between different kinds of cells involved in grafting processes. Plasmodesmal coupling between callus cells was quantified by determining the mobile fraction and half-life of fluorescence redistribution and compared with that of other cell types. Results demonstrated that adhesion and callus proliferation occurred in both compatible and incompatible combinations one week after grafting. Nevertheless, the new cambium formation derived from the callus tissue appeared to be delayed in incompatible heterografts. A different cell wall composition as well as an enhanced metabolism was detected in the incompatible unions. Dye-coupling analysis revealed that the plasmodesmal coupling was highest between callus cells. In addition, a stronger cell-to-cell communication was also observed at the graft interface from compatible graft combinations two weeks after grafting. These new findings strengthen the idea that callus cells are playing a central role in scion/rootstock interaction and that late rejection is predetermined already at the initial steps of union formation.